

fourteen days in chrysalis at the seasonal temperature. The specimens bred by myself were developed in somewhat more than ten days, when the mean of the lowest temperature during that period was $71^{\circ}06$ F. and the highest $75^{\circ}5$ F.

In conformity with this, I found that *V. urticae* is the best species for experiment, owing to its not requiring so high a temperature for development. On Plate VIII. fig. 3 is represented one of the specimens of *V. Iö* which were the subjects of experiment. It has the left mesothoracic leg reproduced precisely in the same stage of development as the new limb in *Panesthia*.

EXPLANATION OF PLATE VIII.

- Fig. 2.* Inferior surface of *Panesthia* —? (magnified two diameters) with the left posterior leg reproduced.
Fig. 3. Inferior surface of specimen of *Vanessa Iö*, from which the left mesothoracic leg was removed at the end of the fourth change of the larva.

XVII.—*Notes on Buccinum undatum*.

By ALBANY HANCOCK, Esq.

DURING a short residence at Cullercoats in 1841, I paid some attention to the various forms of *Buccinum undatum*, with the view to determine whether the several reputed species of this protean shell should retain the rank to which they have been elevated by some naturalists; or be reduced to mere synonyms.

In furtherance of this object I collected extensive suites of the different varieties, and soon ascertained that there are three well-marked forms, which on this coast at least do not appear to run into each other, and which are procured from distinct localities and from different depths of water. These three forms are distinguished from each other by their general shape and habit, and not merely by the undulations and striæ, characters of little importance in this portion of the genus, and on which conchologists have placed too much reliance. In all the three varieties the undulations and striæ are very variable; the form of the mouth and columella, however, is constant throughout, never losing the essential characteristics, which are retained in the most robust and coarsely undulated as well as in the most delicate and smooth.

At first I was inclined to think it probable that these three varieties might prove to be distinct species; but after a lengthened and careful investigation I feel satisfied that they are mere varieties, though of permanent and strongly-marked characters, resulting from locality and depth of water. The animals of these three varieties do not appear to vary.

It is evident from what has been said respecting the undula-

tions and striæ, that the surface of the shell in this species cannot be depended on, whether these three varieties are to be considered specifically distinct or not; but that failing the animal we must look to the columella and mouth, and of course to the general form and habit, for specific characters. Keeping this in view, I have drawn together the following notes, which I trust may assist in elucidating this intricate species.

I find by a recent number of the 'Annals,' that Mr. Wm. King has described these three varieties, giving an account of their localities and general habits as I pointed them out to him, shortly after I had commenced the examination of the species. I was rather surprised at this, particularly in respect of the coarse variety without an epidermis, and the shore variety, as I believe he had never collected these two forms himself, nor has he ever possessed a sufficient number of them to illustrate their peculiar modifications and the permanency of their characters, and as he was aware that I was about to publish on the subject. He however commits an error, when he states that the shore variety is only found on rocks and pebbly bottoms. Had he attained an accurate knowledge of the subject, such as might be derived from personal experience on the coast of Northumberland, he must have known that it also occurs on mud.

It has been stated by Mr. Gray, that "the thickness, the roughness, and the smoothness of the surface of shells appear to depend, in a great measure, on the stillness or agitated state of the water which they inhabit. The species of our own coast," that gentleman says, "afford abundant instances of this: the shells of *Buccinum undatum* and *B. striatum* of Pennant have no other difference, than that the one has been formed in rough water, and is consequently thick, solid and heavy; and the other in still water of harbours, where it becomes light, smooth, and often coloured."

This is scarcely corroborated by what is observed on the Northumberland coast: there, the thickest and roughest forms are from twenty fathoms water, and the thinnest and smoothest from much greater depths. In both these cases the water is probably less agitated than in harbours, where the depth is generally much less. The third variety, however, which is intermediate in coarseness and thickness, is procured between tide-marks, and consequently subjected to the most violent action of the sea. The thin delicate specimens are, I believe, always found on a soft sandy or muddy bottom, and the strong rough individuals on hard or rocky ground. It is therefore probable that the food, varying in localities so different, may modify development. The three principal varieties themselves undergo considerable change on different grounds, irrespective of depth. Thus the beach variety on rocks

is strong, rather rough and without an epidermis, but on mud it is clothed with a thick hairy epidermis, and is comparatively smooth and thin. No doubt many causes are in operation to produce these changes, and the stillness or the agitation of the water may have some influence; but the nature of the ground and depth would appear to be the chief agents in modifying the forms of this species.

The mouth of *B. undatum* is oval, and the arch of the columella is not much interrupted at its junction with the outer lip by the bulging of the body whorl into the mouth; near the middle there is an obscure fold or swelling which gives to the columella the appearance of being twice bent, and before sloping off to the left it is advanced towards the outer lip: the enamel does not extend far over the body whorl.

Slight variations of course occur; in some the mouth is wider and more rounded than in others, and the columella varies a little in length: as a general rule it is shortest in the thin and delicate varieties, but to this there are many exceptions.

All the various forms of *B. undatum* concur in these characters of the columella and mouth, and may be placed with one or other of the three principal varieties found on the coast of Northumberland, which I shall now proceed to describe.

Variety 1. is found in forty fathoms water and upwards on a muddy bottom.

Mr. Alder informs me that on the west coast of Scotland it occurs in much shallower water.

This variety is undoubtedly the true *B. undatum*, and is taken everywhere on the British shores: it is sometimes four or five inches long; the shell is moderately thick with the undulations well-developed, and is always covered with a somewhat strong hairy epidermis; the spire is usually as long as the mouth, and the whorls are considerably rounded. In this state it is the *B. vulgare* of Da Costa, and the *B. undatum* of Müller, Bruguière, Montagu, Donovan, Kiener, Brown and others. The *B. anglicanum* of Brown and the *B. striatum* of Pennant also belong to this state, varying only by having the undulations more or less obliterated, and the spiral striæ well-marked and regular. The *B. anglicanum* of Lamarck is not a British species.

This variety is occasionally very thin and delicate, and has the spire sometimes considerably produced and the whorls much rounded. The *B. undatum* of Brown (Illust. Conch. 2nd. ed. pl. 3. fig. 2) is an example of the extreme form of this state which occurs not unfrequently on the Dogger-bank. It is however impossible to draw any line of demarcation between these thin, delicate, elongated shells and the more general appearance of this variety.

Fleming unites *B. Humphreysianum* with his *B. striatum*. I

have seen nothing, however, to warrant the union of that species with any of the varieties of *B. undatum*, and am inclined to consider the former well characterized; it is distinguished from the latter by the ovate form of the mouth and the shape of the columella, as well as by the character of the surface.

The *B. carinatum* of Turton is a mere lusus of the deep-water variety (var. 1.). There is in the Newcastle Museum a specimen taken by the Rev. J. Law on the Durham coast like Turton's shell with the whorls flattened and carinated above, without undulations, and rather finely and regularly striated. The form of the columella and mouth of this specimen also agrees with the figure of *B. carinatum*, and proves it to be *B. undatum*, whilst the epidermis and general form of the shell place it with this variety.

Varieties like *B. carinatum* occur in various species, and are occasioned by some original malformation of the mantle, or by injuries sustained by it. These varieties therefore frequently exhibit old fractures of the shell. I possess a specimen of *Littorina vulgaris* which has the whorls strongly flattened and carinated above. The shell however was originally of the normal form; but a fracture is apparent in the second or third whorl, and from thence the abnormal appearance is continued throughout the succeeding whorls. Had the fracture been unattended by injury to the mantle, the shell would have assumed its proper shape, as is commonly seen to be the case in repaired shells.

Variety 2. is procured in twenty fathoms water on a hard gravelly bottom.

It is common on the Northumberland and Durham coasts, where it is brought to shore by the fishing-boats. This variety is smaller than variety 1, rarely measuring more than three inches long; it is somewhat fusiform, very thick, heavy and rugged, and generally much undulated; the spire, which is as long as the mouth, is conical, and the whorls are not much rounded; the mouth is white, or occasionally of a yellowish colour: this form has no epidermis.

The *B. undatum* of Pennant perhaps belongs to this variety, judging from the figure, in which the outer lip appears to be in a growing state. An elongated form of it is figured in Brown's 'Illustrations of Conchology,' 2nd ed. pl. 3. fig. 1. In Mr. Alder's cabinet there is a specimen from Zetland precisely agreeing with this figure, which is stated to be from an individual procured from deep water off the Orkney coast. The *B. Zetlandicum* of Forbes also appears to belong to this variety, differing from Mr. Alder's shell and Captain Brown's figure only in being devoid of undulations, and more regularly and finely striated; the spire, too, is not quite so much produced. A specimen closely resembling the *B. Zetlandicum* was taken on the Durham coast

by the Rev. George Cooper Abbs: it is almost without undulations, and is finely and regularly striated. There can be little doubt that this individual is a mere modification of variety 2.

The *B. Zetlandicum* seems to be different from *B. fusiforme* of Broderip, with which Professor Edw. Forbes, however, is disposed to unite it. It is probable that *B. fusiforme* occurs in the seas around Zetland, for I have seen a drawing of a shell brought from thence by Dr. Charlton which agrees very accurately with Broderip's figure, particularly in the form of the columella and mouth, the peculiarities of which would appear to distinguish this species from all its allies.

In the Newcastle Museum there is a very much elongated shell with the whorls flattened and the apex much acuminate. This specimen was taken on the Durham coast by the Rev. J. Law, and is undoubtedly a mere *lusus* belonging to variety 2: it is only an inch and a half long, and is imperfectly and obscurely undulated. In other respects it is a very good representation of *B. acuminatum* of Broderip; it lacks however somewhat of the perfect symmetry of that shell, but has the strong plait and general form of the columella, thus proving it to be a slight modification of Broderip's shell, which however most probably belongs to variety 1, as it is described to have an epidermis.

After a careful examination of the specimen in the Newcastle Museum, it seems to me impossible to insist on the specific distinctness of *B. acuminatum*; and it is satisfactory to observe that Mr. Gray considers the specimen of that reputed species in the British Museum to be merely a variety of *B. undatum*. The flattened whorls and the shape of the spire are evidently of no importance as specific characters; and the form of the mouth and columella does not distinguish it from *B. undatum*. It is true the characters of these parts are considerably exaggerated, but certainly not more so than might be expected in a *lusus*, whose deviation from the normal form is mainly dependent on the extraordinary growth of the pillar.

Variety 3. occurs between tide-marks on rocks and mud.

This variety is not uncommon on the coasts of Northumberland and Durham; I have received it also from the east coast of Scotland and the west coast of England, and Mr. Alder has taken it in the Isles of Bute and Arran. It may always be distinguished from the two preceding varieties by its short, conical spire and large body whorl; the mouth is longer than the spire, and the undulations are never very strong, and are sometimes quite obliterated; the whorls are somewhat flattened; the epidermis, which is frequently wanting, is occasionally strong and hairy; and the shell is generally of a uniform darkish brown colour, occasionally of a yellowish hue, sometimes white; I have never seen it with co-

loured bands as in the preceding varieties, though, from imperfect indications of them in one or two instances, it is not improbable that this variety may occasionally assume the markings of the deep-water shells* ; the mouth is rarely white, most frequently of a deep rich purple-brown, occasionally tawny or of a fine bright yellow, particularly when the shell is white or pale.

A very interesting modification of this variety occurs on the Lancaster Sands, where it was procured in abundance by Mr. Charles M. Adamson. The undulations of this form are scarcely to be distinguished, and in many individuals are completely obliterated ; the striæ are generally very strong and regular, with finer striæ between them, giving the surface precisely the appearance of *B. striatum* of Pennant ; the surface is however occasionally devoid of the more elevated striæ, and is closely covered with fine but somewhat irregular striæ. Another striking modification of this variety was taken by the Rev. J. Law on rocks near Sunderland : it is white with a bright yellow mouth, having the surface well undulated and the striæ strong and much elevated.

Dr. Johnston mentions in the 'Proceedings of the Berwickshire Naturalists' Club,' a shell with a purple mouth that occurs in Berwick Bay, which probably belongs to this variety ; and the *B. undatum* of Gould's 'Invertebrata of Massachusetts' appears also to resemble it. The golden-coloured mouth of the American shell, and its locality, which is stated to be "on the rocky bars in Boston harbour," go far to prove that it belongs to this form. Professor Edw. Forbes also mentions in his 'Malacologia Mønsensis' a dwarf form of this variety as occurring near Bergen in Norway, and in the Firth of Forth. With these three exceptions, this strongly-marked variety appears to have escaped the notice of writers on the subject.

Newcastle-on-Tyne, January 26, 1847.

XVIII.—On a second form of Fructification in *Peyssonnelia Squamaria*. By C. MONTAGNE, D.M., in a Letter to the Rev. M. J. BERKELEY, M.A., F.L.S.

I TOLD you in my last letter of a new form of fructification which I had just discovered in a specimen of *Peyssonnelia Squamaria* from Algiers. I propose at present to trace the history of this discovery, to describe these new organs, and to subjoin some brief notes on Nemathecia.

In studying the Fungi collected by Drège at the Cape which had been placed in my hands by Professor Miquel of Amsterdam, I found under the number 4108 (44) a specimen of *Peyssonnelia*

* Since writing the above, Mr. Richard Howse has informed me that he has recently taken this variety with coloured bands.